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Agate Fossil Beds National Monument 2012 Resource Brief

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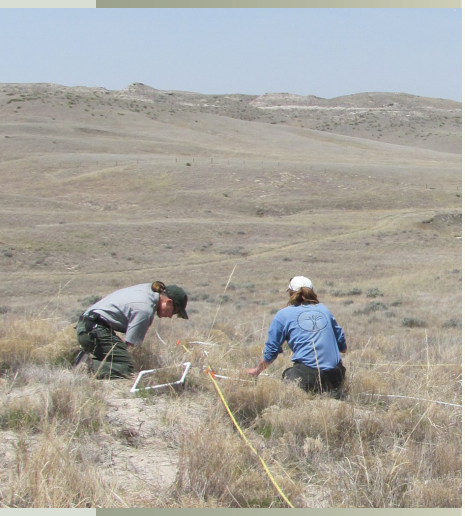
AGATE FOSSIL BEDS NATIONAL MONUMENT
2012 RESOURCE BRIEF



Above: Seasonal field staff sampling vegetation at Agate Fossil Beds NM.

Right: Tenpetal blazingstar (*Mentzelia decapetala*).

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PLANT COMMUNITY MONITORING

Overview: The Northern Great Plains Inventory and Monitoring Network staff completed the second year of plant community monitoring at Agate Fossil Beds National Monument (NM) in 2012. This was a much drier year than 2011 throughout the region, resulting in less vegetation cover, shorter plant height, and a thicker litter layer.

Compared to 2011, vegetative cover in Agate Fossil Beds NM decreased by 48%, and average height of the herbaceous layer decreased 44%. On average, there were 5 native plant species per square meter plot. Exotic plants were less abundant at Agate Fossil Beds than in most area parks, though riparian areas have significant cover of invasive plants such as yellow iris (*Iris pseudacorus*) and Canada thistle (*Cirsium arvense*).

Highlights: Inventory & Monitoring staff completed a pilot study of the riparian areas of the park. The tall vegetation, deep river, and hot weather challenged the crew, but excellent data was acquired. Baseline data on the abundance of invasive yellow iris, which has long been a management concern, can be used to guide future eradication efforts. I&M staff intends to continue riparian monitoring in future years based on the success of the pilot study.

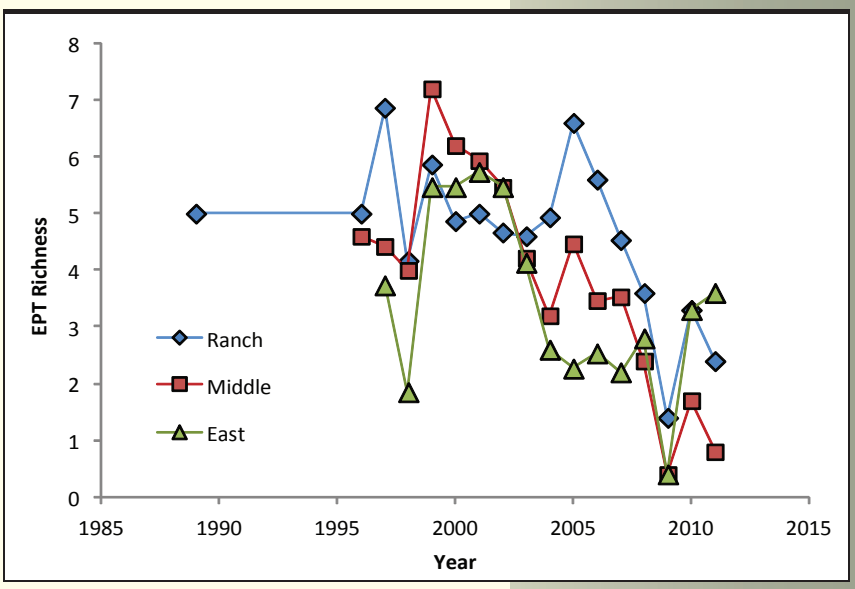
Condition Indicator	*Current Status/Trend*	*Rationale for Resource Condition*
Plant Community		
Upland Plant Community Structure and Composition		Overall species diversity and herbaceous cover was high, and the diversity of native plants falls within the natural range of variation for mixed-grass prairies.
Exotic Plant Early Detection and Management		Monitoring efforts showed low cover of exotic species in upland areas of the park, but riparian surveys indicated high cover of invasive species.
Aquatic Invertebrate Assembly		
EPT Taxa richness		EPT (Ephemoptera, Plecoptera, and Trichoptera--mayflies, stoneflies, and caddisflies--sensitve insect orders) richness and other indicators of ecosystem health indicate that there has been a decline in the condition of the Niobrara River in Agate Fossil Beds NM between 1989 and 2011.

Note: Table based on State of the Parks Reports - see annual report for more details. Green indicates "good condition", yellow indicates "caution", and red indicates "significant concern".

AQUATIC INVERTEBRATE MONITORING

Overview: Aquatic invertebrates are excellent indicators of ecosystem health because they are ubiquitous, abundant, relatively long-lived, diverse, and typically sedentary. Aquatic invertebrates are sensitive to changes in river quality because their growth, survival, and reproduction decline with ecosystem condition.

Highlights: The ecosystem quality of the Niobrara River at Agate Fossil Beds NM has declined over time according to metrics calculated from aquatic invertebrate samples. The number of mayfly, stonefly and caddisfly taxa (EPT richness) declined over time in the Niobrara River. Mayflies, stoneflies, and caddisflies are sensitive to pollution, and fewer EPT taxa generally indicate declining ecosystem health. For example, the lowest EPT richness recorded occurred in 2009 after diesel spilled into the river upstream of the park.



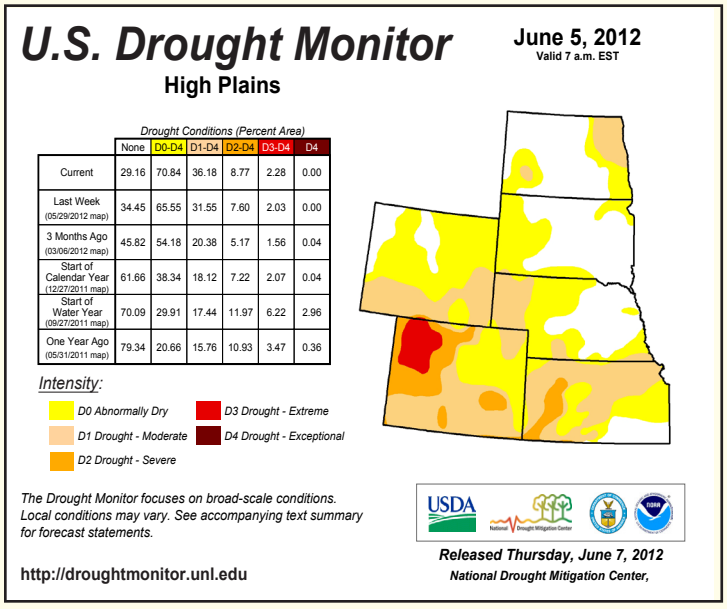
Other invertebrate metrics also indicate that the health of the Niobrara River is declining, such as the average tolerance value of invertebrates (Hilsenhoff's Biotic Index). The decline may be due to several interacting factors including changes in flow, the establishment of pike from downstream, an increase in the abundance of invasive yellow iris, and impacts from upstream events.

Top: Invertebrate EPT taxa richness from 1989-2011 from 3 locations in the Niobrara River in Agate Fossil Beds NM.

Bottom: Drought conditions at Agate Fossil Beds NM during June when NGPN surveyed vegetation.

WEATHER AND CLIMATE MONITORING

Overview: Weather is a fundamental driver of ecosystems in the northern Great Plains. Trends in temperature and precipitation may help explain trends seen in other resources such as plant communities.



Highlights: Agate Fossil Beds NM experienced moderate drought conditions June 2012 when vegetation monitoring took place. The drought worsened throughout the summer and fall. By the end of 2012, the area was experiencing an exceptional drought.

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